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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/576,635

04/21/2006

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EXAMINER

BERMAN, SUSAN W

ART UNIT

PAPER NUMBER

1796

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/576,635	<b>Applicant(s)</b> BOWMAN ET AL.	
	<b>Examiner</b> /Susan W. Berman/	<b>Art Unit</b> 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 23-25, 29, 30, 32-34 and 44-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 23-25, 29, 30, 32-34 and 44-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3-2-10</u> .  | 6) <input type="checkbox"/> Other: _____                          |

***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03-02-2010 has been entered.

***Response to Amendment***

Claim 23 recites that the initiator is selected from camphorquinone and 2,2-dimethoxy-2-phenyl acetophenone with no additional initiator and that the material cures without oxygen inhibition upon exposure to light and that the cured material exhibits a flexural strength of greater than 100 Mega Pascals.

The rejection of claims as being obvious over the disclosure of Jochum et al alone is withdrawn in order to simplify the issues.

The rejection of claims over Jochum et al in view of Rheinberger et al is maintained.

New grounds of rejection over Rheinberger et al are set forth herein below.

Applicant's arguments filed 03-02-2010 have been fully considered but they are not fully persuasive.

Jochum et al in view of Rheinberger et al: Applicant argues that Jochum et al do not teach a flexural strength greater than 100 MPa for the disclosed compositions. This argument is not persuasive of patentability for the following reasons. Jochum et al teach compositions

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comprising at least 10 wt. % polythiol compounds and at least 10 wt % poly-ene compounds that cure upon exposure to visible light wherein the initiator is an acylphosphine oxide. Examples 1 and 2 comprise the same thiol and ene monomers as in applicant's Example 48. The surface hardness of the disclosed compositions is 200 MPa and 250 MPa respectively and no smeary layer results. Applicant provides only one example, in Table 1, wherein the flexural strength of the visible light cured composition is greater than 100 MPa. This composition comprises specific monomers "TATATO" and "PETMP" in a 1:1 ratio, 60 wt % silanized quartz filler and camphorquinone with EDAB as the initiator and accelerator. There are no claims commensurate in scope with this example of flexural strength greater than 100 MPa. There are no comparative examples representative of Jochum et al to show a difference in flexural strength obtained when camphorquinone or 2,2-dimethoxy-2-phenylacetophenone is used instead of acylphosphine oxide as initiator. There are no additional examples comprising different kinds of thiol-ene monomers wherein camphorquinone or 2,2-dimethoxy-2-phenylacetophenone is used as initiator. The choice of photoinitiator would not be expected to result in different properties being obtained after photopolymerization of the same thiol-functional monomer and the same vinyl-functional monomers, in the absence of evidence to the contrary. The reason is that it is the polymerizable materials that would be expected to determine the properties of the polymerized product.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 23-25, 29, 30, 32-34 and 44-47 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase “an initiator selected from camphorquinone and 2,2-dimethoxy-2-phenyl acetophenone” is improper Markush language. The phrase should read “an initiator selected from camphorquinone or 2,2-dimethoxy-2-phenyl acetophenone” or should read “an initiator selected from the group consisting of camphorquinone and 2,2-dimethoxy-2-phenyl acetophenone”.

***Claim Rejections - 35 USC § 102/35 USC § 103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 23-25, 29, 30, 32-34 and 44-47 are rejected under 35 U.S.C. 103(a) as obvious over Rheinberger et al (5,889,132). Rheinberger et al disclose thiol-ene dental compositions and photoinitiators therefor, including camphorquinone and 2,2-dimethoxy-2-phenylacetophenone (column 27, line 32, to column 28, line 30, and column 28, lines 39-50). Fillers are taught in

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column 28, lines 58-65. With respect to claims 45-46, Rheinberger et al teach that the  $\alpha$ -diketones, such as camphorquinone, are preferably used with an amine reducing agent (column 28, lines 39-50, and Examples 7 and 11). Example 11 contains particulate filler, i.e., silanized pyrogenic silica, and uses camphorquinone as initiator with 2-ethylhexyl-dimethylamino benzoate as activator, thus anticipating the instant claims. Examples 7 and 11 do not contain initiator in addition to camphorquinone.

Rheinberger et al teach that the disclosed compositions show only slight polymerization shrinkage and produce polymerizates with high mechanical strength in the Abstract, column 2, lines 31-34, and column 28, lines 26-30. However, with respect to claim 23, Example 11 discloses a flexural strength of 89 MPa, which is lower than the instantly claimed 100 MPa. With respect to claim 29, Example 11 discloses a polymerization shrinkage of 0.9 volume %. The change in volume was determined in Example 7 to be 0.5%. With respect to claim 30, Rheinberger et al do not disclose the average weight loss, when dried, of the thiol-ene polymer. With respect to claims 32-33, Rheinberger et al do not disclose the specific shrinkage stress of the polymerized material. Rheinberger et al do not specifically discuss oxygen inhibition of cure. However, since Rheinberger et al disclose thiol-ene dental compositions comprising each of the components and specified photoinitiators set forth in the instant claims, the properties of the cured polymerizates would be expected to be as set forth in the instant claims, in the absence of evidence to the contrary. The reason is that Rheinberger et al teach that the disclosed compositions show only slight polymerization shrinkage and produce polymerizates with high mechanical strength.

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Claims 23-25, 29, 30, 32-34 and 44-47 are rejected under 35 U.S.C. 103(a) as obvious over Rheinberger et al (5,889,132).

Rheinberger et al disclose thiol-ene dental compositions and photoinitiators therefor, including camphorquinone and 2,2-dimethoxy-2-phenylacetophenone (column 27, line 32, to column 28, line 30, and column 28, lines 39-50). Fillers are taught in column 28, lines 58-65. With respect to claims 45-46, Rheinberger et al teach that the  $\alpha$ -diketones, such as camphorquinone, are preferably used with an amine reducing agent (column 28, lines 39-50, and Examples 7 and 11). Example 11 contains particulate filler, i.e., silanized pyrogenic silica, and uses camphorquinone as initiator with 2-ethylhexyl-dimethylamino benzoate as activator, thus anticipating the instant claims. Examples 7 and 11 do not contain initiator in addition to camphorquinone.

Rheinberger et al teach that the disclosed compositions show only slight polymerization shrinkage and produce polymerizates with high mechanical strength in the Abstract, column 2, lines 31-34, and column 28, lines 26-30. However, with respect to claim 23, Example 11 discloses a flexural strength of 89 MPa, which is lower than the instantly claimed 100 MPa. With respect to claim 29, Example 11 discloses a polymerization shrinkage of 0.9 volume %. The change in volume was determined in Example 7 to be 0.5%. With respect to claim 30, Rheinberger et al do not disclose the average weight loss, when dried, of the thiol-ene polymer. With respect to claims 32-33, Rheinberger et al do not disclose the specific shrinkage stress of the polymerized material. Rheinberger et al do not specifically discuss oxygen inhibition of cure.

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It would have been obvious to one skilled in the art at the time of the invention to select camphorquinone or 2,2-dimethoxy-2-phenylacetophenone as the photoinitiator in the compositions disclosed by Rheinberger et al. One skilled in the art at the time of the invention would have been motivated by a reasonable expectation of successfully photoinitiating polymerization of the thiol-ene dental compositions, because Rheinberger et al teach that camphorquinone or 2,2-dimethoxy-2-phenylacetophenone are suitable photoinitiators for the disclosed thiol-ene dental compositions and using camphorquinone in Examples 7 and 11.

It would further have been obvious to one skilled in the art at the time of the invention to determine the weight percents of the disclosed thiol-ene and filler components required to obtain a desired polymerization shrinkage or mechanical strength from the disclosure of Rheinberger et al. The reason is that Rheinberger et al teach that the disclosed compositions show only slight polymerization shrinkage and produce polymerizates with high mechanical strength and provides examples with low volume shrinkage and high mechanical strength. There is no comparative data of record to show that unexpected results are obtained for the instantly claimed compositions compared with compositions taught by Rheinberger et al. It is noted that the composition disclosed in applicant's Example consists of "TATATO" and "PETMP" and camphorquinone and that Rheinberger et al also employ "PETMP" but do not disclose "TATATO" as a mercapto compound for the disclosed compositions.

With respect to claims 45-46, It would have been obvious to one skilled in the art at the time of the invention to employ an amine reducing agent with a camphorquinone initiator. The reason is that Rheinberger et al teach that the  $\alpha$ -diketones, such as camphorquinone, are preferably used with an amine reducing agent.



Claims 23, 24, 25, 29, 30, 32-34 and 44-47 are rejected under 35 U.S.C. 103(a) as obvious over Jochum et al (5,100,929) in view of Rheinberger et al (5,889,132).

Jochum et al disclose dental compositions comprising thiol-enes and a photoinitiator and filler (column 2, line 33, to column 3, line 19). Jochum et al teach that compositions containing at least 10% by weight polythiol compound, at least 10 % by weight poly-ene compound and an acylphosphine compound as photoinitiator provide a cured product free of a smeary layer. Jochum et al teach that camphorquinone and acyl phosphine oxides are known as initiators responsive to visible light that when used in combination with tertiary amines produce a pronounced layer of smear in UV curing compositions and that this disadvantage is overcome by the disclosed thiol-ene compositions comprising an acylphosphine oxide (column 2, lines 9-26). Fillers are taught from column 6, line 64, to column 7, line 15. Jochum et al teach that camphorquinone and acyl phosphine oxides are known as initiators responsive to visible light for polymerizing dental compositions. Jochum et al do not disclose using 2,2-dimethoxy-2-phenyl acetophenone as initiator.

Rheinberger et al disclose thiol-ene dental compositions and photoinitiators therefor, including camphorquinone, acyl phosphine oxides and 2,2-dimethoxy-2-phenylacetophenone (column 28, lines 39-50). With respect to claims 45-46, Rheinberger et al teach that the  $\alpha$ -diketones, such as camphorquinone, are preferably used with an amine reducing agent (column 28, lines 39-50, and Examples 7 and 11).

It would have been obvious to one skilled in the art at the time of the invention to substitute camphorquinone or 2,2-dimethoxy-2-phenylacetophenone for the acyl phosphine

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oxide photoinitiator in the compositions disclosed by Jochum et al. Jochum et al provide motivation by teaching that camphorquinone, as well as acylphosphine oxides, is well known for visible initiation of polymerization of dental compositions. Rheinberger et al specifically teach that camphorquinone, 2,2-dimethoxy-2-phenylacetophenone or acylphosphine oxides are suitable photoinitiators for thiol-ene dental compositions. One skilled in the art at the time of the invention would have been motivated by a reasonable expectation of successfully photoinitiating polymerization of the thiol-ene dental compositions taught by Jochum et al using camphorquinone or 2,2-dimethoxy-2-phenylacetophenone as photoinitiator, as taught by Rheinberger et al in analogous dental compositions.

With respect to claims 45-46, It would have been obvious to one skilled in the art at the time of the invention to employ an amine reducing agent with a camphorquinone initiator. The reason is that Rheinberger et al teach that the  $\alpha$ -diketones, such as camphorquinone, are preferably used with an amine reducing agent. One skilled in the art at the time of the invention would have been motivated by a reasonable expectation of curing the composition although possibly producing a smear layer as taught by Jochum et al.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to /Susan W. Berman/ whose telephone number is 571 272 1067. The examiner can normally be reached on M-F 9:30-6:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on 571 272 1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SB  
3/12/2010

/Susan W Berman/  
Primary Examiner  
Art Unit 1796